



Firearms and Mental Health: An Analysis of Homicide

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Abstract: Often after acts of violence, arguments are made as to why the violent act occurred. Two arguments dominate the discussion as to why the violence occurred. The first argument is that the ability to acquire firearms leads to increased violence. The second argument is that the poor mental health system in the United States is predictive of increased acts of violence. The current analysis examined the prevalence of firearms and the mental health system of 49 states in the United States. Regression analysis reveals that as the rate of firearms increased, the homicide rate increased. The mental health system did not affect the homicide rate.

Introduction

On July 20, 2012, James Holmes entered a rear door to the Aurora 16 Multiplex Theater in Aurora, Colorado. Holmes had propped the door open earlier so that he could reenter the theater at a later time. After getting dressed “head-to-toe” in protective equipment, such as a ballistic helmet, he threw two tear gas canisters into the theater (CNN Library, 2019). As the gas filled up the room, Holmes began shooting into the crowded room. He killed 12 and wounded 70 people.

The police said Holmes used an AR-15 rifle, a 12-gauge shotgun, and at least one of two .40 caliber handguns recovered from the crime scene. Moreover, when the police arrived at Holmes’s apartment, they found he had booby-trapped the residence with explosives and flammable liquid. The police removed more than 30 homemade grenades from the apartment.

In the aftermath of the mass shooting, information came to light that Holmes had seen at least three mental health professionals before the shooting (Mother Jones, 2019).

Moreover, authorities found an undelivered package that Holmes had addressed to his psychiatrist with detailed plans of the attack, his fascination with killing, and the word “Why?” written multiple times in the package (CNN Library, 2019).

Holmes’ attorneys stated that Holmes was experiencing a psychotic episode when he committed the mass shooting. Holmes received 12 life sentences without the possibility of parole. After this tragic event, people endeavored to make sense of the horror, which Holmes brought to Aurora and the United States. There were two arguments for why these events seem to occur in the United States. The first is that the prevalence of firearms in the United States increases the likelihood of homicide. Research has demonstrated that more firearms in an area are predictive of more violence (Branas et al., 2009; Miller et al., 2002; Moore & Bergner, 2016; Siegel et al., 2013). The second argument that emerges on the level of violence in the United States is that the mental health system has failed. Research has been conducted examining the level of violence committed by individuals with a mental illness (Fazel & Grann 2006; Fazel, Gulati, Linsell, Geddes, and Grann, 2009; Vinkers, de Beurs, Barendregt, Rinne, & Hoek, 2012).

The current study is not about mass shootings. We are examining the predictors of homicide using a firearm prevalence and a mental illness measure. However, the James Holmes example discussed above points out the arguments being made by the two camps on violence. Holmes had a large number of firearms, which were capable of killing a large number of people. Holmes bought the firearms used in the mass shooting legally from three different stores in Colorado (Castillo, 2016). This has provided evidence, to some, that firearms are at the root cause of the violence in the United States.

On the other hand, many have pointed to mental illness as the cause of violence in the United States. Holmes had been to three different mental health professionals before the shooting. He was displaying erratic behavior before he committed the horrific crime, such as dropping out of college. The undelivered package demonstrated that Holmes may have been suffering from some form of mental illness around the time of the shooting. His attorneys stated that Holmes was guilty, but he was suffering from a mental illness.

These two arguments are often brought forward when acts of violence occur in the United States. The current study examines the two arguments and includes measures for both firearms and mental illness. These measures will be used to find if there is statistical evidence that either firearm prevalence, mental illness, or both are predictive of homicide in the United States.

Firearm Prevalence and Crime

Scholars have attempted to find the association between firearms and crime. Some scholars have argued that increase firearm ownership would be predictive of decreased

crime (Kleck, 1988; Kleck & Gertz, 1995; Lott, 1998; Lott & Mustard, 1997). Examining conceal and carry laws for 3,054 counties in the United States for 17 years, Lott and Mustard (1998) found that allowing individuals to carry more firearms would reduce the number of homicides by 1,500 over this time frame. The argument that is being made by Lott and Mustard (1998) is that individuals would be able to use their firearms in a defensive manner, which would help to scare off or even harm would-be attackers.

The argument that increasing firearms would decrease crime was backed up by Wolfgang (1958). Wolfgang (1958) argued that there is no causal relationship between firearms and homicide. He stated that individuals who are intent on killing will find a way to do so, regardless if they have to use a firearm, knife, and so on. To back up his argument, Wolfgang (1958) demonstrated that in Pennsylvania from 1924 to 1926, firearms were used in 68 percent of the homicides with a homicide rate of 5.9 per 100,000 people during this time. He then illustrated that from 1948 to 1952 only 33 percent of homicides involved a firearm and the homicide rate had increased to 6.1 per 100,000 people. Wolfgang (1958) ultimately concluded that the prevalence of firearms in the area does not affect violent crime, because other weapons will simply be used.

Other scholars have rejected the arguments made above. Instead, some scholars argue that increasing the number of firearms will increase the crime levels in an area (Branas et al., 2009; Miller et al., 2002; Moore & Bergner, 2016; Siegel et al., 2013). Researchers argued that firearms are more lethal than other weapons, thus more people will die from an encounter with a firearm (Zimring and Hawkins, 1987). Moreover, individuals are more likely to feel embolden with a firearm. Firearms are easier to use in an attack because there is not much opportunity for the victim to fight back as can be done with a knife (Zimring and Hawkins, 1987).

Research has been supportive of the argument that increased firearms are predictive of increased crime (Branas et al., 2009; Miller et al., 2002; Moore & Bergner, 2016; Siegel et al., 2013). Data for the 200 largest counties in the United States demonstrated that increased firearm prevalence is associated with increased levels of total homicide (Cook & Ludwig, 2006). Other scholars examined four proxy measures of firearm prevalence, they found that regardless of the proxy used, there was a significant and positive association between firearm prevalence and state-level rates of homicide, firearm homicide, suicides, firearm suicides, and unintentional firearm deaths (Miller, Azrael, & Hemenway, 2002).

To further demonstrate that increased firearm prevalence leads to increased crime, Miller, Azrael, and Hemenway (2002, pg. 271) pointed out that children living in high firearm prevalent states were “16 times more likely to die from an unintentional firearm injury, 7 times more likely to die from firearm suicide, 3 times more likely to die from a firearm homicide, and overall, twice as likely to die from suicide and homicide” than

children living in states with low firearm prevalence. Branas et al. (2009) examined data on victims of a crime that had a firearm and did not have a firearm from 2003 to 2006 in Philadelphia. They found that victims who had a gun were 4.46 times more likely to be shot in an assault and 4.23 times more likely to be fatally shot in an assault. Further, in assaults where the victim had a chance to resist, individuals in possession of a firearm were 5.45 times more likely to be shot. The scholars argued that having a firearm in your possession may falsely empower individuals to think they can handle dangerous situations. These individuals may be more likely to enter a dangerous situation and be in harm's way because of their overconfidence.

Other scholars have examined firearm prevalence for states in the United States (Siegel, Ross, & King III, 2013) and cross-nationally (Hemenway & Miller, 2000; Killias, 1993; Killias, van Kesteren, and Rindlisbacher, 2001). These scholars also conclude that increased firearm prevalence is predictive of increased crime. Hepburn and Hemenway (2004, pg. 417) concluded that there is “no net beneficial effect of firearm ownership.”

Mental Illness and Crime

Mass shootings have caused widespread public fear of mental illness and its connection to violent behavior. Phelan and Link (1998) demonstrated that the public is fearful and believes that individuals with a mental illness pose a significant risk of violence. People with mental illness have been demonized as monsters (Fisher & Liberman, 2013). Ahonen, Loeber, and Brent (2017) pointed out that after many mass shootings, mental illness was discussed as a probable cause, such as a school shooting in Roseburg, OR, where 10 people were killed. Ahonen, Loeber, and Brent (2017) point out that politicians often promote the idea that mental illness leads to increased violence. They explained that President Obama gave a speech making this argument. Furthermore, President Obama issued an executive order to direct more resources to identify and report individuals suffering from mental illness to the National Instant Criminal Background Check System (Ahonen, Loeber, & Brent, 2017).

Moreover, *Mother Jones* (2019) has created a database tracking mass shootings in the United States. As of this writing, there have been 115 mass shooting events from 1982 to 2019. Of the 155, *Mother Jones* (2019) listed 59 (51.3 percent) of these events as being committed by individuals with a known mental illness. From the information provided by *Mother Jones*, media, and politicians, one concludes that mental illness is a major cause of violence in the United States.

Ahonen, Loeber, and Brent (2017) hypothesized this scenario of mental illness is the cause of violence. They state, “if this was true, one can expect great benefits from public health policy that focuses mostly on those individuals in particular” (Ahonen et al., 2017, pg. 1). Their argument in this scenario is that if we wanted to reduce crime,

we could focus on mental illness. Federal policy, like President Obama's executive order, could be geared to reducing access to guns by individuals with a mental illness. States could increase public health policies to aid individuals with mental illness, such as increasing access to hospital beds.

However, it is not clear what form of mental illness is being discussed or attributed to the violence by the public. President Obama's executive order describes how we should identify and report individuals with mental illness, but what is meant by mental illness is not clear. Should we be vigilant and report on schizophrenia? Bipolar? Depression? Different disorders may have a more direct association with violence and others with no association at all. Shaw et al. (2006) examined different types of mental illness and individuals convicted of homicide. They found that individuals with schizophrenia were more likely to be convicted of homicide than other types of mental illness. Moreover, they found that there is an association between schizophrenia and homicide.

Another problem when examining mental illness and violence is the definition used to detect mental illness can skew the results. For example, Shaw et al. (2006) found that different definitions of mental illness produced different findings. They examined individuals who were diagnosed with a mental illness at any point in their lifetime, mental illness at the time of the offense, contact with a mental health service, and manslaughter on the grounds of diminished responsibility. Shaw et al. (2006) stated that they found limited overlap in these categories. Therefore, using different definitions for statistical analysis can produce different results.

A second scenario was proposed by Ahonen et al. (2017), which argues that if public policy focuses on reducing violence by individuals with a mental illness, but this is not the main group causing violence, then our policy is not going to reduce violence in any meaningful manner. Ahonen et al. (2017) demonstrate that the risk of violence by individuals with a mental illness is low. They state "there is limited evidence that mental health problems are independent predictors of violence when accounting for other factors, such as substance use or previous violence" (Ahonen et al., 2017, pg. 9).

Other analyses have been conducted to find the risk of individuals with mental illnesses committing violent acts (Fazel & Grann 2006; Fazel, Gulati, Linsell, Geddes, and Grann, 2009; Vinkers, de Beurs, Barendregt, Rinne, & Hoek, 2012). These analyses have found that the risk of committing a violent act ranges from one percent to five percent for individuals with a mental illness. Fazel et al. (2009) conducted a meta-analysis and found the risk of individuals with schizophrenia to range from 3.2% to 9.9%. These are low percentages of risk for individuals with a mental illness to become violent. A policy focusing on mental illness may help to stop one to five percent of the risk, but that leaves from 95 percent to 99 percent unaccounted for by focusing on mental illness. This is not to say that individuals with mental illness do not need help,

indeed we as a society should strive to help. However, by focusing on a small percent of the problem we will make no meaningful reduction in violence.

Firearms, Mental Illness, and Violence

There has been some research done exploring the association between firearm violence and mental illness. Most of the research has found that there is a weak or no association between mental illness and firearm violence (Metzl & MacLeish, 2015; Rosenberg, 2014; Swanson et al., 2005). Rosenberg (2014) examined gun control legislation aimed at individuals with mental illness. She found that aiming this legislation at people with mental illness is not supported by any research. Instead, the legislation is a reaction to the “monsters” as Fisher and Liberman, (2013) pointed out.

Metzl and MacLeish (2015) demonstrated that there is a small amount of firearm-related violence committed by individuals with a mental illness. Instead, mental illness comes to reflect our stereotypes of who commits violence and stands in for older tropes, such as race and age. They go on to explain how mental illness ceases to be a diagnosis and instead becomes a sign of violence.

The current analysis examines these arguments about firearms and mental illness. Some researchers have argued that increased firearms will reduce crime (Kleck, 1988; Kleck & Gertz, 1995; Lott, 1998; Lott & Mustard, 1997), while others argue that increasing firearms would increase crime (Branas et al., 2009; Miller et al., 2002; Moore & Bergner, 2016; Siegel et al., 2013). When examining mental illness some politicians have argued that we need to improve our mental health system and restrict firearms to individuals with a mental illness. Scholars have pointed out that the level of violence is low among people with a mental illness (Ahonen et al., 2017; Fazel & Grann 2006; Fazel, Gulati, Linsell, Geddes, and Grann, 2009; Vinkers, de Beurs, Barendregt, Rinne, & Hoek, 2012). We attempt to aid in the analysis in this area by including a firearm and a mental illness measure in our model. By doing so we can attempt to find if both, one, or neither of these factors are significant predictors of homicide. By including both measures we may get a clearer picture of what has a more significant association with homicide.

Methods

Dependent Variable

The homicide rate for 2016 was collected for each state from the FBI Uniform Crime Report (UCR). The UCR is the major source of crime information in the United States (Vito & Maahs, 2012). The UCR is a voluntary program where police agencies report the number of crimes within their jurisdiction over the previous year. The FBI compiles

these reports and publishes them on their website. The year 2016 was used in the current analysis because the mental illness measure was for the year 2016.

Independent Variables

The independent variables for the current analysis were selected based on their inclusion in previous analyses of homicide. The firearm rate was acquired from the Center for Disease Control and Prevention (CDC). The prevalence of firearms in a particular area of the United States is hard to determine. Laws and cultural norms prevent databases and other firearm collection methods to be created in the United States. Criminologists have developed many different proxy measures to acquire the prevalence of firearms in an area. The rate of hunting licenses issued per capita was used in Krug's (1968) analysis of firearms. Duggan (2001) used county-level subscription rates to *Guns & Ammo* magazine as a proxy for firearm prevalence. Cook (1979) used the percentage of homicides and suicides involving a firearm, which became known as the Cook Index.

The most accurate measure of firearm prevalence has been the percentage of suicides by firearm (Azrael et al., 2004). To conclude that the percent of suicides by firearm was the most accurate measure, Azrael et al. (2004, p. 56) examined several different proxies for firearm prevalence and concluded that "the percentage of suicides committed with a gun, performs consistently better than the others in cross-sectional comparisons." The authors also pointed out that, over time, the percentage of suicides by firearm was the most accurate predictor of firearm prevalence in an area (Azrael et al., 2004). The percentage of firearms by suicide has also been used in numerous examinations of firearm prevalence (Azrael, Cook, & Miller, 2004; Cook & Ludwig, 2006; Hemenway & Miller, 2000; Moore & Bergner, 2016; Ruddell & Mays, 2005; Siegel et al., 2013). Therefore, the percentage of suicides by firearm was used in the current analysis. When there is a low number of suicides the CDC will withhold the data from the public. This withholding is done to prevent breaking medical confidentiality. Wyoming was not included in the current analysis because the CDC withheld information on suicides by firearm from the public.

The mental illness measure was collected from the Treatment Advocacy Center. The Treatment Advocacy Center is a national nonprofit organization dedicated exclusively to eliminating barriers to the timely and effective treatment of severe mental illness. The center published a report on the number of available hospital beds available for each state (Fuller et al., 2016). The center collected information on the states in 2016 by using official state publications, interviews with personnel in state agencies with access to bed statistics, and court filings. The data includes voluntary and involuntary beds for patients who enter treatment either through the civil (non-criminal) or the forensic (criminal justice) systems.

Like firearm prevalence, there is no measure for mental illness that is perfect. The rate of hospital beds was used as a proxy measure of the state of the mental health system in each state. If the state has a robust mental health system, we can assume that the state would have a large number of hospital beds available. On the other hand, states with poor mental health systems would have a small rate of beds available. Arguments have been made that the broken mental health system is associated with violence. States with better mental health systems would have reduced crime because their mental health system is not broken.

Control Variables

The social support variable was collected from the United States Census Bureau. The bureau publishes an annual report on state government finances. The 2016 Annual Survey of State Government Finances was used to acquire the social support variable. The current analysis calculated the rate of public spending per resident for each state using the monetary figure provided by the survey and the total population of each state.

The unemployment rate, residential instability, and GINI Index were collected from the United States Census Bureau for 2016. The residential instability measure was calculated by subtracting 100 from the percent of individuals living in the same home at the start and end of 2016. This variable is similar to measures of residential instability used in previous analyses (Osgood & Chambers, 2000). The South has higher rates of crime than other regions of the country and has been controlled for in previous studies (Blau & Blau, 1982; Gastil, 1971; Nisbett & Cohen, 1996). States were allocated as non-south or south based on their classification in the United States Census Bureau. A dummy variable South was created to identify the states in the southern part of the United States.

Also following previous analyses (Osgood & Chambers, 2000), the racial heterogeneity measures were included in the current analysis. Alesina et al. (2003) created an ethnic, linguistic, and religious fragmentation index that can be applied to the different groups found within an area. We created the same measure using the state's racial composition from the United States Census Bureau. The racial heterogeneity measure can be calculated as follows:

$$FRACT_j = 1 - \sum_{i=1}^N S_{ij}^2$$

where S_{ij} is the share of the group i ($i = 1 \dots N$) in state j . The index ranges from zero to one. A score of zero refers to a perfectly homogeneous state (i.e., everyone in the state identifies the same) and a score of one indicates a highly heterogeneous state (i.e., many different groups in the state).

Findings

The current study had an *N* of 49. Because of the small number of suicides in Wyoming, the CDC would not release the number of suicides by firearm in the state. The CDC suppresses any information that may violate an individual's privacy. The District of Columbia is not a state, therefore we could not get information on the U.S. Census Bureau's 2016 Annual Survey of State Finances. Statistical analyses with small sample sizes can be predisposed to having issues with multicollinearity. Appendix A demonstrates the correlations for the variables in the analysis. Researchers have argued that any correlation of .80 or above is considered high (Berry & Feldman, 1985; Knoke, Bohrnstedt, & Mee, 2002). For studies with small sample sizes, Berry and Feldman (1985) maintained that we should be troubled with any correlations of .70 or above. None of the correlations in the current analysis were .70 or above. Residential instability and population density had the highest correlation at -.641, which is below the .70 threshold. Furthermore, to safeguard that multicollinearity was not present Variance Inflation Factors (VIFs) were examined. Neter, Wasserman, and Kutner (1989) stated that VIFs above 10 would be a cause for concern. On the other hand, Ouimet (2012) argued that for small sample sizes any VIF above five could be problematic. Other scholars have stated that these are too generous of a threshold and a score above four should be explored further (Hair, Black, Babin, & Anderson, 2014). We inspected the VIFs for our model. No score was above four. The highest VIF for the current analysis was 2.99, which is below the threshold of four.

Next, Tabachnick and Fidell (2007) suggested inspecting the Condition Index as a way to check for the presence of multicollinearity. Any score on the Condition Index above 30 would need further investigation. If there was a Condition Index score above 30 one would then need to check the Variance Proportions. If there were two or more scores above .5 it would be an indication of multicollinearity. The current investigation did not have any scores that would show the presence of multicollinearity. Finally, Berry and Feldman (1985) and Hair et al. (2014) stated that researchers could regress each independent variable on all of the others. The closer to one the R^2 is, the more likely there has been a violation. After regressing each independent variable on each other we had no cause for concern. Therefore, we are comfortable with the predictive power of the models in the current analysis.

Before examining the multivariate analysis of homicide rates for the states, we can glean some important information from examining the descriptive statistics for the independent variables. The state with the highest homicide rate was Alabama at 8.40 in 2016, while the state with the lowest homicide rate was New Hampshire at 1.13. Moreover, the top five highest homicide rates are all states located in the southern part of the United States (Alabama, Louisiana, South Carolina, Tennessee, and Mississippi). This lends support to the inclusion of a control for states located in the South.

When examining the rates of firearms, Missouri had the highest rate of firearms in the United States at 15.54. New Hampshire had the lowest rate of firearm ownership at 1.97. New York had the highest social support at 3.23 in 2016, while Utah had the lowest at 1.16. Iowa had the least amount of beds available for mental illness in 2016 at 2.0 for every 100,000 people. North Dakota had the largest amount of beds available for mental illness at 18.50. North Dakota had the lowest unemployment rate at 2.0, while Mississippi had the highest unemployment rate at 9.60.

The most residential instability belonged to Alaska at 18.80 percent and the most residential stability belonged to New Jersey at 10.40 percent. The most densely populated state was New Jersey at 1,201.71 people per square mile, while Alaska was the least dense state at 1.29 people per square mile. Nevada had the highest percentage of divorce at 14.10 and New Jersey had the lowest percent of divorce at 8.50. The state with the highest score on the GINI index was New York at .51, while the lowest score was Alaska at .42. Finally, the most racial heterogeneity was Hawaii at .78 and Maine had the least diversity at .10.

Turning the multivariate analysis we can see in Table 2 that the firearm rate is significant and positive ($\beta = .234$; $p < .01$). As the rate of firearms in the state increased, the homicide rate increased. This finding does lend support for previous analyses that demonstrate that firearms do increase crime in the area (Branas et al., 2009; Miller et al., 2002; Moore & Bergner, 2016; Siegel et al., 2013). The mental illness measure was not significant in our model. The rate of hospital beds in the state is not associated with the homicide rate. This illustrates that arguments about mental health being a cause of homicide are unfounded.

Table 2 illustrates that social support is significant and negative ($\beta = -.214$; $p < .05$). As the level of social support goes down, the homicide rate increased. Social support plays a significant role in reducing homicide for states, which is in line with previous research (Lee, 2001; Pratt & Godsey, 2003; Savolainen, 2000).

The unemployment rate was also a significant predictor of homicide in our model ($\beta = .248$; $p < .05$). As the unemployment rate increased, the homicide rate increased. This finding does indicate the unemployment is a key area states can focus on to reduce their homicide rate. This is also in line with previous research analyses (Edmark, 2005; Raphael & Winter-Ebmer, 2001). Population density was significant and negative ($\beta = -.483$; $p < .001$). As the state became less densely packed, the homicide rate increased. This finding is in line with previous analyses that found population density to be inversely related to crime (Osgood & Chambers, 2000).

Divorce was significant and positive ($\beta = .256$; $p < .05$). As the divorce rate increased, the homicide rate increased. An increase in divorce is a significant predictor of crime in previous analyses (Caceres-Delpiano & Giolito, 2012; Stolzenberg & D'Alessio,

Table 1: Descriptive Statistics (N = 49)

	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Standard Deviation</i>
Homicide Rate	1.13	8.40	3.65	1.75
Firearm Rate	1.97	15.54	8.62	3.45
Social Support	1.16	3.23	2.00	.56
Unemployment	2.80	9.60	6.86	1.50
Mental Illness	2.00	18.50	11.50	3.94
Residential Instability	10.40	18.80	15.05	1.98
Population Density (log10)	.11	3.08	1.99	.59
Divorce	8.50	14.10	11.44	1.42
Racial Heterogeneity	.10	.78	.36	.147
GINI Index	.42	.51	.46	.018

Table 2: Regression Results for Homicide Rate (N = 49)

	<i>B</i> (<i>S.D.</i>)	β	<i>V.I.F.</i>
Firearm Rate	.119 (.038)	.234**	1.180
Mental Illness	-.045 (.033)	-.102	1.197
Social Support	-.672 (.256)	-.214*	1.420
Unemployment	.290 (.138)	.248*	2.990
Residential Instability	-.183 (.096)	-.206	2.491
Population Density (log10)	-1.437 (.308)	-.483***	2.281
Divorce	.315 (.132)	.256*	2.461
Racial Heterogeneity	3.013 (1.295)	.253*	2.531
GINI Index	12.774 (9.518)	.135	2.162
South	1.629 (.319)	.441***	1.592
R ²	.822		

*p < .05; **p < .01; ***p < .001

2007). Racial heterogeneity was significant and positive ($\beta = .253$; $p < .05$). As the state became more diverse, the homicide rate increased. This finding is in line with previous examinations of diversity and crime (Chon, 2012; Kornhauser, 1978; Moore & Recker, 2017; Wells & Weisheit, 2004). The variable South was also significant and positive ($\beta = .441$; $p < .001$). The predicted homicide rate for states in the South is 1.629 more than the predicted homicide rate for states not in the South. Southern states have an increased level of homicide, which is in line with previous analyses of homicide (Blau & Blau, 1982; Gastil, 1971; Nisbett & Cohen, 1996).

Conclusion

Arguments have been made for why there may be increased levels of violence in one area. Some scholars have argued that increased firearm prevalence leads to increased levels of violence in an area. As discussed in the mass shooting in Aurora, Colorado, the number of firearms in the area can lead to devastating consequences. The current analysis did find support for the argument that increased levels of firearms are predictive of increased levels of homicide. An increase in firearms produces an increase in homicide.

Another line of reasoning on why some areas have increased levels of violence in the poor mental health system. The argument states that individuals with a mental illness became violent and hurt others. The example of James Holmes illustrates that he may have been suffering from a mental illness at the time of the mass shooting. The current analysis found no evidence that this is the case. The mental illness measure was not significantly associated with the homicide rate. The number of hospital beds in the state did not predict the homicide rate of the state. Moreover, the argument that people suffering from a mental illness acquire firearms to commit horrific acts of violence may be overstated. Appendix A illustrates the correlations of the variables used in the current analysis. The correlation between firearms and mental illness is $-.135$ and is not significant. This correlation is low. Previous research has also provided evidence that mental illness may not be as connected to violence as thought (Ahonen et al., 2017; Fazel & Grann 2006; Fazel, Gulati, Linsell, Geddes, and Grann, 2009; Vinkers, de Beurs, Barendregt, Rinne, & Hoek, 2012).

The current analysis also demonstrated that other factors could also aid in the reduction of homicide. The level of social support was a significant predictor of crime. Lower levels of social support are predictive of higher homicide rates. States may be able to combat violence by increasing levels of social support. Moreover, the divorce rate was a significant predictor of crime. Higher rates of divorce are associated with higher levels of homicide. States could promote policies aimed at keeping individuals married, such as social support that may ease financial tensions within the marriage. Furthermore, the unemployment rate was a significant predictor of crime. As the unemployment rate

increased, the homicide rate increased. Like the social support and divorce variables, states could aid in lowering the unemployment rate to reduce the level of homicide.

Other variables in the analysis may be harder for states to combat. The population density had an inverse relationship to crime. As the population density decreased, homicide increased. This has been found in previous analyses of homicide (Osgood & Chambers, 2000). The racial heterogeneity variable was also significant. As the state becomes more diverse, the homicide rate increased. This has been found in previous analyses of homicide (Chon, 2012; Kornhauser, 1978; Moore & Recker, 2017; Wells & Weisheit, 2004). The South variable was predictive of homicide. States in the south had more homicide than states not located in the southern United States.

Future studies should aim to find measures of mental illness within an area. These measures are not readily available. Like firearms, there is no accurate database on the number of individuals with a mental illness in an area. No database would allow researchers to find which mental illness is prevalent so that we can examine if a particular mental illness is associated with violence. Laws and privacy concerns ensure that there will be no database available in the future. It is up to researchers to begin to produce proxy measures for mental illness. Azrael et al. (2004) demonstrated that a quality proxy for firearm prevalence could be found. Researchers can begin to do the same to find a proxy for mental health. Then we can begin to tackle the question of does the poor mental health system produces violence in the United States.

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